

LYNN PRICE

Staff Scientist
Leader, China Energy Group
Energy Analysis & Environmental Impacts Department
Environmental Energy Technologies Division
Lawrence Berkeley National Laboratory

1 Cyclotron Road, MS 90R4000
Berkeley, CA 94720
(510) 486-6519
(510) 710-2877 cell
LKPrice@LBL.gov

EMPLOYMENT

Lawrence Berkeley National Laboratory, Berkeley, California
1990 - Present

Price Associates, Berkeley, California
1989 - 1990

MHB Technical Associates, San Jose, California
1983 -1989

PROFESSIONAL EXPERIENCE

- Lead author, Intergovernmental Panel on Climate Change Second Assessment Report, Technical Paper on Technologies, Policies and Measures for Mitigating Climate Change, Special Report on Emissions Scenarios, Third Assessment Report, Fourth Assessment Report, Fifth Assessment Report
- Principal investigator, Energy Foundation China projects on industrial energy efficiency policies and programs, modeling, benchmarking, auditing, energy-efficient technologies and measures, and low-carbon development in China
- Principal investigator, Energy Foundation China, Rocky Mountain Institute, and Energy Research Institute project on Reinventing Fire: China modeling China's potential energy use and CO₂ emissions in 2050
- Principal investigator, U.S. Department of Energy projects related to industrial sector energy efficiency policies and programs in China
- Principal investigator, U.S. Department of State projects on energy service performance contracting, boiler/steam system energy efficiency and fuel switching, and for the Asia Pacific Partnership on cement industry energy efficiency and greenhouse gas mitigation in China
- Principal investigator, U.S. Environmental Protection Agency projects related to benchmarking, energy efficiency improvement, and use of alternative fuels for the Chinese cement industry
- Principal investigator, Hewlett Foundation and Oak Foundation projects related to future coal consumption scenarios for China
- Principal investigator, California Air Resources Board project on Evaluation of Efficiency Activities in the Industrial Sector Undertaken in Response to Greenhouse Gas Emission Reduction Targets

- Principal investigator, California Energy Commission project on development of an energy balance for the State of California and on optimization of product lifecycle greenhouse gas emissions from products produced in California

PROFESSIONAL SERVICE AND AWARDS

Group Leader of the China Energy Group, Energy Analysis & Environmental Impacts Department, Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory – 2012 to present

Deputy Group Leader of the China Energy Group, Group, Energy Analysis & Environmental Impacts Department, Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory – 2011 to 2012

Deputy Group Leader, International Energy Studies Group, Energy Analysis Department, Lawrence Berkeley National Laboratory – 1998 to 2007

Guest Professor, University of Science and Technology Beijing

Affiliated Faculty, Energy and Resources Group, University of California-Berkeley

Lead Author of Intergovernmental Panel on Climate Change (which won the Nobel Peace Prize 2007) - 1993 to present

Member of China Industry Team, which was awarded the *Extraordinary Achievement and Leadership Results Award* in 2010 by ClimateWorks Foundation

Member of China Cement Kiln Project Team that was awarded the U.S. Environmental Protection Agency's *James W. Craig Pollution Prevention Leadership Award* – 2009.

Member of the Strategic Advisory Group of the Institute for Industrial Productivity

Member of the Leadership Council of the China-U.S. Energy Efficiency Alliance

Outstanding Performance Award, Lawrence Berkeley National Laboratory – 2007, 1999, 1995

Co-Chair, 2003 American Council for an Energy-Efficient Economy's Summer Study on Energy Efficiency in Industry

Reviewer for *Nature Climate Change*, *Energy*, *The International Journal*, *Energy Policy*, *Climate Policy*, *Journal of Industrial Ecology*, *Environmental Science & Technology*, *ACEEE Summer Study on Energy Efficiency in Industry*, *ACEEE Summer Study on Energy Efficiency in Buildings*

Expert for World Resources Institute's China FAQs Network for Climate and Energy Information

Host and advisor for international guests in the International Energy Studies Group and China Energy Group at Lawrence Berkeley National Laboratory

EDUCATION

University of Wisconsin – Madison, Institute For Environmental Studies

Master of Science in Land Resources, May 1982

Phi Kappa Phi Honor Society

University of Wisconsin - Madison

Bachelor of Arts in Geography, May 1980

Graduation with Distinction

PUBLICATIONS

Peer-reviewed journal articles

Lewis, J., Price, L., Fridley, D., Lu, H., Romankiewicz, J., in review. "China's Non-Fossil Energy Targets in an International Context," *Nature Climate Change*.

de la Rue du Can, S., Price, L., Zwickle, T., in review. "Understanding the Full Climate Change Impact of Energy Consumption and Mitigation at the End-Use Level: A Proposed Methodology for Allocating Indirect Carbon Dioxide Emissions," *Applied Energy*.

Kong, L., Hasanbeigi, A., Price, L., Liu, H., in review. "Technical and Cost Analysis of Energy-Efficiency and Carbon Dioxide Emissions Reduction Potential in China's Pulp and Paper Industry." *Resource Conservation and Recycling*.

Ma, D., Hasanbeigi, A., Price, L., Chen, W., Wang, L., in review. "A Bottom-Up Approach for Quantifying the Air Emission Reductions and Co-Benefits: the Case of China's Ammonia Industry," *Clean Technology and Environmental Policy Journal*.

Shen, B., Dai, F., Price, L., and Lu, H., 2014. "California's Cap-and-Trade Program and Insights for China's Pilots," *Energy and Environment*, Volume 25 (3 & 4): 551-575

Hasanbeigi, A., Arens, M., Price, L. 2014. "Alternative Emerging Ironmaking Technologies for Energy-efficiency and Carbon Dioxide Emissions Reduction: A Technical Review," *Renewable and Sustainable Energy Reviews*, [Volume 33](#): 645–658.

Hasanbeigi, A., Jiang, Z., Price, L., 2014. "Retrospective and Prospective Analysis of the Trends of Energy Use in Chinese Iron and Steel Industry," *Journal of Cleaner Production*, Volume 74: 105-188.

Hasanbeigi, A. Price, L., Zhang, C., Aden, N., Li, X., and Shangguan, F., 2014. "Comparison of Iron and Steel Production Energy Use and Energy Intensity in China and the U.S.," *Journal of Cleaner Production*, Volume 65: 108-199.

Price, L., Zhou, N., Fridley, D., Ohshita, S., Lu, H., Zheng, N., Fino-Chen, C., 2013. "Development of a Low-Carbon Indicator System for China," *Habitat International*, Volume 37: 4-21.

Zhou, N., Price, L., Fridley, D., Ohshita, S., Zheng, N., Hu, M. and Hu, X., 2013. "Strategies for Low Carbon Development"(in Chinese). *Science and Management*. Volume 33: 3-25.

Shen, B., Wang, J., Li, M., Li, J., Price, L. and Zeng, L., 2013. "China's Approaches to Financing Sustainable Development: Policies, Practices, and Issues," *WIREs Energy Environment*. Volume 2: 178–198. doi: 10.1002/wene.66

Hasanbeigi, A., Price, L., Fino-Chen, C., Lu, H., Ke, J. 2013. "Retrospective and Prospective Decomposition Analysis of Chinese Manufacturing Energy Use and Policy Implications." *Energy Policy*, [Volume 63](#): 562–574.

Zhou N., Price L., Ohshita S., Zheng N., and M. Hu. 2013. "A Guidebook for Low-Carbon Development at the Local Level (in Chinese)." *Science and Management* Volume 33 (5): 21 – 35.

Ke, J., McNeil, M., Price, L., Khanna, N., Zhou, N., 2013. "Estimation of CO₂ Emissions from China's Cement Production: Methodologies and Uncertainties," *Energy Policy*, Volume 57: 172-181.

Hasanbeigi, A., Lobscheid, A., Lu, H., Price, L., and Dai, Y. 2013. "Quantifying the Co-benefits of Energy-Efficiency Programs: A Case-study for the Cement Industry in Shandong Province, China," *Science of the Total Environment*, Volumes 458–460: 624-636

Ke, J., Price, L., McNeil, M., Khanna, N., and Zhou, N. 2013. "Analysis and Practices of Energy Benchmarking for Industry from the Perspective of Systems Engineering," *Energy* Volume 54 (2013) 32-44.

Kong, L., Price, L., Hasanbeigi, A., Liu, H., Li, J. 2013. "Potential for Reducing Paper Mill Energy Use and Carbon Dioxide Emissions through Plant-wide Energy Audits: A Case Study in China," *Applied Energy*, Volume 102: 1334–1342.

Hasanbeigi, A., Price, L., Lin, E. 2012. "Emerging Energy-efficiency and CO₂ Emission-reduction Technologies for Cement and Concrete Production: A Technical Review." *Renewable and Sustainable Energy Reviews* Volume 16 (2012) 6220–6238.

Ke, J., Price, L., Ohshita, S., Fridley, D., Zheng, N., Zhou, N., and Levine, M., 2012. "China's Industrial Energy Consumption Trends and Impacts of the Top-1000 Enterprises Energy-Saving Program and the Ten Key Energy-Saving Projects," *Energy Policy* Volume 45 (2012) 739-751.

Hasanbeigi, A. and Price, L. 2012. "A Review of Energy Use and Energy Efficiency Technologies for the Textile Industry," *Renewable and Sustainable Energy Reviews*. Volume 16:6 (August 2012): 3648-3665. <http://escholarship.org/uc/item/4531h558>

Shen, B., Price, L., and Lu, H., 2012. "Energy Audit Practices in China: National and Local Experiences and Issues," *Energy Policy* Volume 46 (2012): 346-358.

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Zhou, N., Ohshita, S., Price, L., and Zheng, N. 2011. "A Low Carbon Development Guide for

Local Government Actions in China," *Carbon Management*. Volume 2 (4): 455-469.

Price, L., Levine, M.D., Price, L., Zhou, N., Fridley, D., Aden, N., Lu, H., McNeil, M., Zheng, N., Qin, Y., Yowargana, P., 2011. "[Assessment of China's Energy-Saving and Emission-Reduction Accomplishments and Opportunities During the 11th Five-Year Plan](#)," *Energy Policy* Volume 39(4): 2165-2178.

Hasanbeigi, A., Menke, C., and Price, L., 2010. "CO₂ Abatement Cost Curve for the Thailand's Cement Industry," *Journal of Cleaner Production*, Volume 18 (15): 1509-1518.

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Price, L., Xuejun Wang, Jiang Yun, 2010. "[The Challenge of Reducing Energy Consumption of the Top-1000 Largest Industrial Enterprises in China](#)", *Energy Policy*, Volume 38 (11).

Worrell, E., Bernstein, L., Roy, J., Price, L., and Harnisch, J., 2009. "Industrial Energy Efficiency and Climate Change Mitigation," *Energy Efficiency*. Volume 2 (2): 109.

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Price, L. and Levine, M.D., 2002. "Sustainable Production and Consumption of Energy: Developments Since the 1992 Rio Summit," *Environmental Law Reporter* 32 (August).

Price, L., Sinton, J., Worrell, E., Phylipsen, D., Hu, X., and Li, J., 2002. "Energy Use and Carbon Dioxide Emissions from Steel Production in China," *Energy, The International Journal* Volume 27(2002): 429-446.

Worrell, E., Martin, N., Price, L., Ruth, M., Elliott, N., Shipley, A. and Thorne, J., 2002. "Emerging Energy Efficient Technologies for Industry" *Energy Engineering Journal* Volume 99 (2):36-55.

Roy, J., Das, S., Sathaye, J., and Price, L., 2002. "Estimating Baselines for CDM: Case of Eastern Regional Power Grid in India," *Environmental Economics and Policy Studies* Volume 5: 121-134.

Ozawa, L., Sheinbaum, C., Martin, N., Worrell, E., and Price, L., 2002. "Energy Use and CO₂ Emissions in Mexico's Iron and Steel Industry," *Energy, The International Journal* Volume 27, 2002: 225-239.

Worrell, E., Price, L., Martin, N., Hendricks, C., and Ozawa Meida, L., 2001. "Carbon Dioxide Emissions from the Global Cement Industry," *Annual Review of Energy and Environment* Volume 26: 303-29.

Worrell, E., Price, L., and Ruth, M., 2001. "Policy Modeling for Energy Efficiency Improvement in US Industry," *Annual Review of Energy and Environment* Volume 26: 117-43.

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Worrell, E. and Price, L., 2001. "Policy Scenarios for Energy Efficiency Improvement in Industry," *Energy Policy* Volume 29 (2001): 1223-1241.

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Worrell, E., Martin, N., and Price, L., 2000. "Potentials for Energy Efficiency Improvement in the U.S. Cement Industry," *Energy, The International Journal* Volume 25: 1189-1214.

Worrell, E., Martin, N., Price, L., 1999, "Energy Efficiency Opportunities in Electric Arc Steelmaking," *Iron and Steelmaker*, January.

Price, L., Michaelis, L., Worrell, E., and Khrushch, M., 1998. "Sectoral Trends and Driving Forces of Global Energy Use and Greenhouse Gas Emissions," *Mitigation and Adaptation Strategies for Global Change*, Volume 3:263-319.

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Worrell, E., Price, L., Martin, N., Farla, J., Schaeffer, R., 1997. "Energy Intensity in the Iron and Steel Industry: A Comparison of Physical and Economic Indicators," *Energy Policy*, Volume 25 (7-9).

Schipper, L., Scholl, L., and Price, L., 1997. "Energy Use and Carbon Emissions from Freight in 10 Industrialized Countries: An Analysis of Trends from 1973 to 1992," *Transportation Research* Volume 2(1): 57-76, 1997.

Levine, M.D., Price, L., and Martin, N., 1996. "Mitigation Options for Carbon Dioxide Emissions from Buildings: A Global Analysis," *Energy Policy* Volume 24(10): 937-949.

Levine, M.D., Geller, H., Koomey, J., Nadel, S., and Price, L., 1995. "Electricity End-Use Efficiency: Experience with Technologies, Markets, and Policies Throughout the World," *Energy: The International Journal* Volume 20(1): 37-61.

Schipper, L. and Price, L., 1994. "Efficient Energy Use and Well Being: The Swedish Example After 20 Years," *Natural Resources Forum* Volume 18(2): 125-142.

Schipper, L., Figueroa, M.J., Price, L., and Espey, M., 1993. "Mind the Gap: The Vicious Circle of Measuring Automobile Fuel Use," *Energy Policy*, Volume 21(12): 1173-1190.

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Rosenfeld, A., Atkinson, C., Koomey, J., Meier, A., Mowris, R., and Price, L., 1993. "Conserved Energy Supply Curves," *Contemporary Policy Issues* Volume 11(1): 45-98.

Peer-reviewed conferences

Price, L., Hasanbeigi, A., Xiong, H., Fu, G., Wanless, E., Hong, L., Lu, H., McIntosh, R., and He, P., 2014. "Envisioning China's Energy-Efficient and Low-Carbon Industrial Sector in 2050: Reinventing Fire Pathway Vision and Methodology," *Proceedings of the China Council for an Energy-Efficient Economy 2014 Fall Study on Industrial Energy Efficiency and Regional Haze*.

Price, L., Zhou, N., Fridley, D., Lu, H., Hong, L., Fino-Chen, C., Ke, J., Ohshita, S., Hu, M., Zhou, Y., Hammer, S., and Hu, X., 2014. "Energy-Efficiency and Greenhouse Gas Mitigation Policy Options: Assisting Chinese Cities in Prioritizing and Choosing Strategies to Implement to Become a Sustainable Community", *Proceedings of the American Council for An Energy-Efficient Economy 2014 Summer Study on Energy Efficiency*. Washington DC: ACEEE.

Hasanbeigi, A., Zeyi J., Price, L. 2014. "Why the Energy Use of Chinese Steel Industry May Peak as Early as 2015?" *Proceedings of the 2014 ECEEE Summer Study on Energy Efficiency in Industry*, June 2-5, 2014. Arnhem, the Netherlands.

Hasanbeigi, A., Lobscheid, A., Lu, H., Price, L., Dai, Y. 2014. "Including the Co-benefits of Energy-Efficiency Programs and Projects in Cost-Benefit Analysis - A Case Study for the Cement Industry." *Proceedings of the International Conference on Clean Energy*. June 8-12, 2014. Istanbul, Turkey.

Hasanbeigi, A., Price, L. 2014. "Emerging Technologies for an Energy-Efficient, Water-Efficient, and Low-Pollution Textile Industry: A Technical Review." *Proceedings of the International Conference on Clean Energy*. June 8-12, 2014. Istanbul, Turkey.

Hasanbeigi, A., Price, L., Lu, H., Fino-Chen, C., Ke, J. 2013. "Retrospective and Prospective Decomposition Analysis of Chinese Manufacturing Energy Use and Policy Implications for Industry Structural Change." *Proceedings of the International Conference on Frontier Issues in Economics and Management*. Beijing University of Chemical Technology. July 3-4, 2013.

Hasanbeigi, A., Kong, L., Arens, M., Price, L. 2013. "Emerging Energy-Efficiency and CO₂ Emissions-Reduction Technologies for Industry: A Review of Technologies for Alternative Ironmaking and Pulp and Paper Industry." *Proceedings of the 2013 American Council for An Energy Efficiency Economy Industrial Summer Study*. Washington DC: ACEEE.

Hasanbeigi, A., Price, L., Lu, H., Fino-Chen, C., Ke, J. 2013. "What Shaped the Chinese Manufacturing Energy Use Since 1995 and What's the Prediction for the Future?" *Proceedings of the 2013 American Council for An Energy Efficiency Economy Industrial Summer Study*. Washington DC: ACEEE.

Hasanbeigi, A., Price, L., Lu, H., Fino-Chen, C. 2013. "Bottom-up Assessment of Chinese Manufacturing Growth and Energy Use Up to 2020." *Proceedings of the 2013 International Energy Workshop*. Paris: International Energy Agency.

Hasanbeigi, A., Price, L., Lu, H., Fino-Chen, C. 2013. "Bottom-up Assessment of Chinese Manufacturing Growth and Energy Use up to 2020." *2013 International Energy Workshop (IEW)* hosted by the International Energy Agency (IEA, Paris, 19 - 21 June).

- Price, L., Zhou, N., Fridley, D., Ohshita, S., Lu, H., Zheng, N., Fino-Chen, C., 2012. "Development of an End-Use Sector-Based Low-Carbon Indicator System for Cities in China," *Proceedings of the American Council for an Energy-Efficient Economy's 2012 Summer Study on Energy Efficiency in Buildings*. Washington, DC: ACEEE.
- Shen, B., Ni, C., Ghatikar, G., and Price, L., 2012. "What China Can Learn from International Experiences in Developing a Demand Response Program," *Proceedings of the European Council for an Energy-Efficient Economy's 2012 Summer Study*. No. 3-153-12. Stockholm: ECEEE.
- Hasanbeigi, A., Price, L., Lu, H., Williams, C. 2012. "International Best Practices in Pre-treatment and Co-processing of Municipal Solid Waste and Sewage Sludge in the Cement Industry." *2012 ECEEE Summer Study on Energy Efficiency in Industry*, September 11-14, 2012. Arnhem, the Netherlands.
- Hasanbeigi, A., Price, L., Lu, H., Williams, C. 2012. "Co-processing of Municipal Solid Waste and Sewage Sludge in the Cement Industry." *The 3rd ISIE Asia-Pacific Meeting*, October 20-21 2012. Beijing, China.
- Romankiewicz, J., Shen, B., Price, L., and Lu, H.Y., 2012. "Addressing the effectiveness of industrial energy efficiency incentives in overcoming investment barriers in China," *Proceedings of the European Council for an Energy-Efficient Economy's 2012 Summer Study*. No. 6-156-12. Stockholm: ECEEE.
- Hasanbeigi, A., Lin, E., and Price, L., 2012. "Emerging Energy Efficiency Technologies for the Cement and Concrete Production, Iron and Steel, and Textile industry: A Technical Review Paper," accepted for oral presentation at the *Industrial Energy Technology Conference (IETC)*, May 2012. New Orleans, LA.
- Hasanbeigi, A., Morrow, W., Fridley, D., Masanet, E., Sathaye, J., Xu, T., Zheng, N., and Price, L. 2012. "Energy Efficiency Potential for China's Cement Industry: A Bottom-up Technology-level Analysis," accepted for oral presentation at the *19th CIRP International Conference on Life Cycle Engineering*, March 2012. Berkeley, CA.
- Zheng N., Fridley D., Zhou N., Levine M. Price L. and J. Ke. 2011. "China's Pathways to Achieving 40% - 45% Reduction in CO2 Emissions per Unit of GDP in 2020: Sectoral Outlook and Assessment of Savings Potential." *Proceedings of the 7th Session of the 13th Annual Meeting of the China Association of Science and Technology*. Tianjin, China: 22 September 2011. (LBNL-5257E)
- Price, L., Hasanbeigi, A., Aden, N., Zhang Chunxia, Li Xiuping, Shangguan Fangqin, 2011. "[A Comparison of Iron and Steel Production Energy Use and Energy Intensity in China and the U.S.](#)," *Proceedings of the American Council for an Energy-Efficient Economy's 2011 Summer Study on Energy Efficiency in Industry*. Washington, DC: ACEEE.

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Price, L., 2008. "Technologies and Policies to Improve Energy Efficiency in Industry." *Proceedings of the American Physical Society's Forum on Physics and Society, Physics of Sustainable Energy: Using Energy Efficiently and Producing It Renewably*, March 1, 2008, Berkeley, California.

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Galitsky, C. and Price, L., 2007. "Opportunities for Improving Energy Efficiency, Reducing Pollution and Increasing Economic Output in Chinese Cement Kilns," *Proceedings of the 2007 ACEEE Summer Study on Energy Efficiency in Industry*. Washington, DC: American Council for An Energy-Efficient Economy.

Price, L., 2005. "Voluntary Agreements for Energy Efficiency or Greenhouse Gas Emissions Reduction in Industry: An Assessment of Programs Around the World," *Proceedings of the 2005 ACEEE Summer Study on Energy Efficiency in Industry*. Washington, DC: American Council for An Energy-Efficient Economy.

Coito, F., Powell, F., Worrell, E., Price, L., and Friedmann, R., 2005. "Case Study of the California Cement Industry," *Proceedings of the 2005 ACEEE Summer Study on Energy Efficiency in Industry*. Washington, DC: American Council for An Energy-Efficient Economy.

Coito, F., Worrell, E., Price, L., Masanet, E., Friedmann, R., and Rufo, M., 2005. "California Industrial Energy Efficiency Potential," *Proceedings of the 2005 ACEEE Summer Study on Energy Efficiency in Industry*. Washington, DC: American Council for An Energy-Efficient Economy.

Price, L., Bartholomew, E., and Mulholland, D., 2004. "Taking Credit for GHG Emissions Reduction Activities of the EPA's State and Local Capacity Building Branch," *Proceedings of the 2004 ACEEE Summer Study on Energy Efficiency in Buildings*. Washington, DC: American Council for an Energy-Efficient Economy.

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Price, L., Worrell, E., and Sinton, J., 2003. "Voluntary Agreements in the Industrial Sector in China," *Proceedings of the Earth Technologies Forum*, April 22-24, 2003, Washington DC.

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